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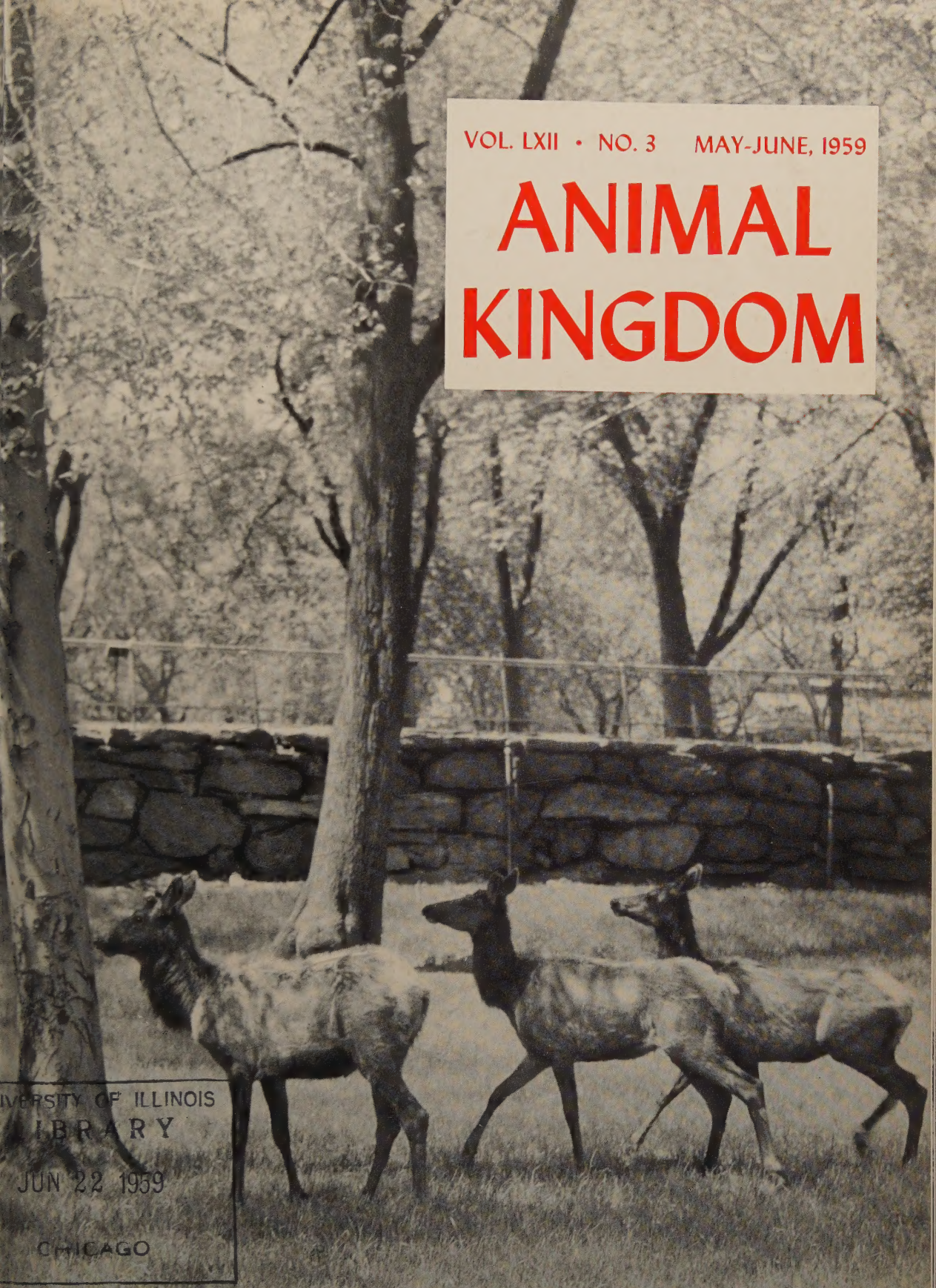
ANIMAL KINGDOM



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ANIMAL KINGDOM

Bulletin of the New York Zoological Society

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The Best Thing New York City Has

THERE HAS ALWAYS BEEN plenty of reason to consider the Bronx Zoo as a "Mecca for all people from everywhere." First, it is obviously a key center of interest and enjoyment for the people of New York for whose benefit it was created and has been maintained throughout the 60 years of its existence.

In addition to what the Zoo means to New Yorkers, it is a magnet for visitors from all over our country and, indeed, to people from all over the world. It is a pity that, somehow or other, a recording system could not have been devised to tell us with accuracy how many people from how many foreign countries have come to the Zoo over the years. There is little question that visitors from virtually every country in the world have at one time or another visited the Zoo. Within our wonderfully diversified collections of animals from every region of the earth they are bound to find species that are typical of their "home country," which is perhaps one reason for their coming.

Only recently New York was visited by some people from other countries, who happened to be much in the public eye during their stay here – Fidel Castro, the revolutionary leader and his staff from Cuba, and the Bolshoi Ballet from the Soviet Union. Though these foreign visitors came from such widely different backgrounds, it was no surprise that both groups came to the Zoo at the first possible moment, spending many hours there. While we could not understand the ejaculations of evident pleasure of the members of the ballet troupe, Fidel Castro summarized his view by a remark that was widely quoted in the press. He said, "The Bronx Zoo is the best thing New York City has." Although not competent to judge his views on other matters, we can easily be persuaded to go along with him on his opinion as to the place the Zoo holds in the affections of the public.

Fairfield Osborn

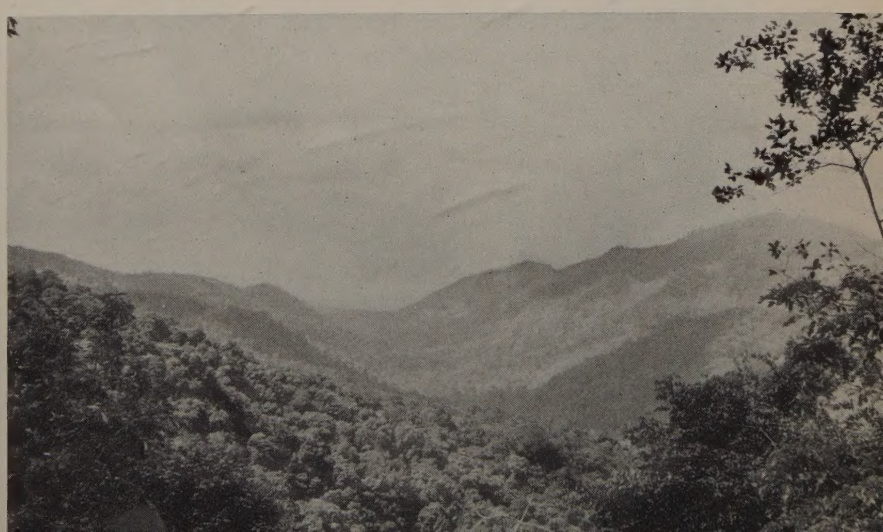
The Mossy-throated Bellbi

n Ornithological Mystery

by WILLIAM G. CONWAY

In Trinidad, on the 31st of March, 1954, William Beebe recorded the first nest of any species of bellbird that had ever been found. t was a flimsy platform, like a pigeon nest, of nterlocking Y-shaped twigs and belonged to the Mossy-throated Bellbird. That the nest of this pecies should be the first reported among the our species of bellbirds was strange in itself, for he Mossy-throat is the least-known member of he whole strange group. The Bare-throated Bell-ird from southeast Brazil has been commonly ept in zoos and may usually be seen in our collec-ion. The London Zoo has exhibited the White r One-wattled Bellbird from the Guianas and northern Brazil, and the grotesque Three-wattled Bellbird from Nicaragua, Costa Rica and Panama vas captured by Charles Cordier during the New York Zoological Society's 1947 expedition. Lee Crandall described its strange calling posture in *Zoologica* in 1948. But the Mossy-throated Bell-ird had never been captured alive and, beyond Dr. Beebe's nest observations and a subsequent ote by Dr. Wilbur Downs who found a nest vith an egg, its habits are little better known han they were 142 years ago when the species vas described by Cuvier.

With such an ornithological mystery waiting to be solved, it was inevitable, when I began making preparations for a visit to Dr. Beebe at Simla, the Trinidad Field Station of the Tropical Research Department, that the Zoological Park's staff strongly urged me to at least *try* to bring back a Mossy-throated Bellbird. It was difficult not to become superstitious about the bird. Trapping a small collection of birds in Trinidad's northern mountain range was certainly an objective of the trip, and tanagers, honeycreepers, even manakins, were planned for with some confidence. I hinted at woodpeckers and openly hoped for Jacamars, never exhibited alive in the United States, but there is something special about a "Mossy-throated" Bellbird. Its nearest kin may be cocks-of-the-rock and umbrella birds, the fruit-crows and calf birds, but its queer name and the few old drawings available – for it had not even been photographed alive – seemed to place it in another and more fanciful class – perhaps with Hairy Frogs and Platypuses. It is not a large bird, but smaller than a pigeon, though larger than a robin. Its body is a light silvery gray, just off white, and its wings are black. It wears a cap of chestnut feathers and is, to this point, attractive



. — The fleshy "moss" varies ength from an eighth of an n to about two inches. Appar-ly it is not extensible, but re observation will be neces-y before we are sure. Right. Mossy-throated Bellbirds live his lower montane rain forest Trinidad and may be heard ing all the time during the . The trees are very high and birds usually stay high, too.

but not especially prepossessing. However, should *Procnias averano carnobarba* turn to face us, any picture we may possibly have formed will be effaced from our minds by the sight of a bird with a long, dense, bushy black beard: not a beard of feathers, or even hair, but *carnobarba* — a fleshy beard! Composed of myriad soft, pliable, slightly string-like wattles, the beard cannot be erected and from our observations is not swollen or extended during courtship. The wattles are not connected with any internal organ, but are a skin specialization and, so far as we know, as Dr. Beebe has noted, "serve only to enhance our ignorance." Obviously, anyone who intended to trap birds in Trinidad could not entirely ignore the Mossy-throated Bellbird.

The ways in which wild birds may be collected are limited only by the ingenuity of the collector and, of course, the habits of the birds. Few of the birds in our collection are captive-bred, though waterfowl and pheasants are notable exceptions to this rule. By and large, when we view a Long-wattled Umbrella Bird, whose exhibition label reads "Andes Mountains of Ecuador," or a Scarlet-tufted Malachite Sunbird, "Mt. Kenya and Mt. Kilimanjaro," we may usually surmise that someone actually went into these far-off areas and devised some method of obtaining birds. An old, sometimes very useful, trapping method is the use of a sticky substance called bird lime, which acts almost like flypaper and holds birds at the perches they frequent. All sorts of specially constructed funnel or maze traps have been devised and various triggered traps have also been developed. Today a net which may be fired over a flock of feeding geese is being used extensively by various wild life agencies for banding and other research purposes. As my visit to Simla could not be a long one, I wished to keep equipment at a minimum and decided to confine myself to "mist nets," widely used by American bird banders. Shipping boxes, miscellaneous pans and certain other special impedimenta were dispatched via Alcoa's steamship *Ferncape,* but the nets and a few other items I carried myself.

The first few days at Simla were spent in orientation. Dr. Beebe provided a wealth of important background information, and Jocelyn Crane swiftly prepared to aid the insistent demands of a bird collection. A base such as Simla, with the wonderfully organized help of a grou of veteran tropical naturalists led by Will Beeb entirely dispelled the difficulties anticipated c a jungle trip. Entomologist Henry Fleming ar Resident Naturalist David Snow guided me several likely collecting spots, and a series of tri was gradually outlined.

On Good Friday morning, Peter, a local b magically provided by Simla, helped me load a automobile with bird crates, mist nets, binocula string, hummingbird vials, camera and speci aluminum poles for a trip to a manakin bathir area which David Snow had pointed out. Eac afternoon between 2:00 and 5:00, at certain poo along a deeply shaded tropical stream which flo down the east side of the Arima Valley to th river below Simla, manakins of two species gath to preen and bathe. During a previous trip to th area I noticed which perches the birds used approach the pools, and now I hoped to use th knowledge.

Peter and I were able to drive within a mile the trapping site, where we unloaded the car clamber down the steep bank of the river wi our equipment and wade through the shallo water below pipe-organ-like bamboos to a narro trail. The trail, or trace, as it is called, was l tered with tiny pieces of leaves dropped by le cutting ants and we followed these casual mar ers until we came to a narrow stream. From he on the going became treacherous and we wad up the stream over rounded, slippery rocks, ca fully avoiding spiny palm trunks and pushi through lush growths of fleshy-leaved grou plants. Climbing through the undergrowth was able to forget this truly beautiful setting think back on Jim Oliver's tales of Fer-de-lan and Bushmasters — and his parting gift, a snal bite kit.

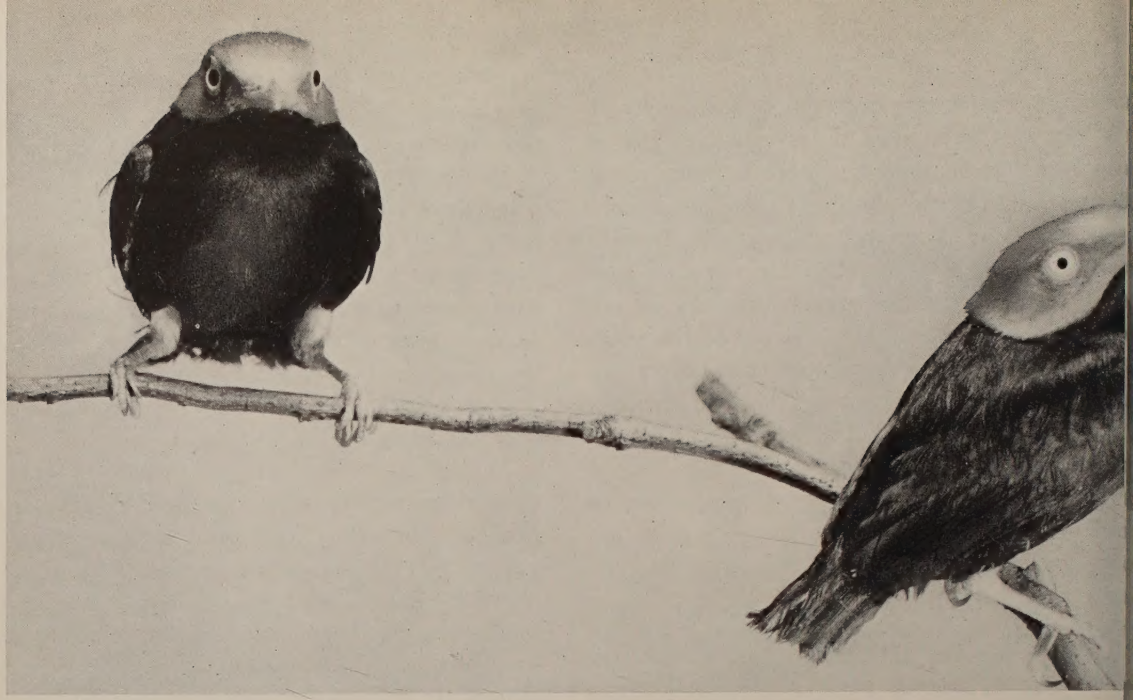
Eventually a clearing appeared and here, ca fully plotting the manakin flyways, we set up c telescoping aluminum poles. Actually design for tree pruning, these hollow tubes may be tended to nearly 30 feet or may be slipped do to a little over six. They enabled us to stand the banks of the stream and raise our mist n to the level of low trees around us where bi were likely to fly. The nets themselves consist black silk or nylon ¾-inch mesh made up thirty-foot lengths eight feet wide. At top a

ottom and at three places through the belly of he net run three silk cords and the net is stretched with its greatest length parallel to the ground, in a vertical position, by the five attachment points at either end. The netting itself is allowed to droop loosely between the cord supports, forming folds in which birds may be entangled. We attached the first net to the poles and raised it high in the air and from only a few feet away the whole trap or "set" became invisible, for the silk mesh is little heavier than a hair net. A properly made set, where rays of sunlight do not reveal the mesh, like sparkling strands of spider gossamer, is so hard to bring in focus that I willingly admit to capturing myself while looking for the trap.

After the high set was completed with the aluminum poles, Peter and I began to tie more nets between trees as quickly as possible along the paths where we expected birds to appear. By the time we finished the third set, however, we had to drop all work to remove an Oily Flycatcher from the first net and a Black-and-white Manakin from the second. Erection of the fourth and fifth nets was so constantly interrupted by captures that we dropped plans to place six nets and took down the fifth. Peter then took a stand behind a huge arum while I made myself comfortable on a rock in the center of the stream. We were soon running back and forth helping each other, releasing species we did not need, now and again herding some especially desirable bird through the undergrowth and shooing him into the nets. A pause came and we realized that rush hour was over and the noon lull had set in.

Most of all, on this trip, we wished to capture Golden-headed Manakins: wonderfully tiny, big-headed, short-tailed birds with carmine thighs, velvety black bodies and startling golden heads set with bright white eyes. Manakins are called "stick men" by Peter, referring to the habits of some species which display on a twig over a cleared courtship arena. Their fascinating habits are well entwined in Zoological Society history, for Dr. Beebe began studying them in 1908 and David Snow is concentrating on them now. Peter spotted a Golden-head flying from perch to perch near one of the nets. Finally, it flew directly towards the net, then veered sharply and slipped below it, and we realized we had both been holding our breath. Suddenly, a flash of gold and black hit the net on our right and manakin No. 1 was ours. I found I had achieved my first case of

ght glints on the mist net, making its strands e as Mr. Conway attaches a rope to one corner ratory to pulling it up to the aerial pathway e birds. The nets are 30 ft. long, 8 ft. high.



buck fever in a Trinidad jungle and my hands shook so badly that I slit the net to make sure the bird was not injured in removal. With a hissing rattle of specialized wing feathers, two Black-and-white Manakins fell into neat pockets in the lower tier of the high net and we telescoped the poles smoothly to remove them. As we raised the net again, an Emerald Hummingbird zoomed into the belly of the upper tier, but I left Peter to remove it, for I had noticed a Sabian Thrush in one of the low nets further up the stream.

Peter released the Emerald and came to help me with the thrush, which righteously bit my fingers as I put him through the indignities attendant on release. The thrush's right leg carried two yellow plastic bands, showing that it had been ringed by Dr. Snow in his studies at the St. Pat's Estate below Simla.

By 3:45 in the afternoon we had trapped nearly forty birds, of which we kept a number for the collection or photography. We dropped our nets and like two exhausted spiders began the tedious business of attempting to gather in nearly 1,200 square feet of silk mesh, with its incomparable ability to snag on every jungle twig and leaf. We were interrupted several times when birds lodged in the net even as we untied it, but we managed to begin the trek out at 5:00. Each crate of birds we darkened by a huge philodendron leaf.

On arrival at Simla, each bird was placed in a

Above.—Two male Golden-headed Manakin netted. They are a new subspecies to our coll Right. — The iris of an immature male shows of white. Adults have the iris completely

carefully masked separate compartment with it own food and water container. The followin morning exact portions of fruit and mealworm were rationed out and each bird was carefully ob served so that we might see which were not feed ing and must be force-fed or released.

A number of devices were used to induc freshly captured specimens to feed, for man birds do not seem to recognize substitute food a being edible. Thus, the birds were enclosed i cages with solid backs, roofs and sides, and th fronts so covered that light entering the cage wa focussed upon the food. This trick usually help direct a bird's attention to unfamiliar foods suc as oranges and canned cherries. Some bird plunge directly into their first captive courses wit evident relish, but a few must be helped whil their mouths are gently opened and especiall delectable tidbits placed on their tongues or eve pushed well down into their esophagus. Thus, fine Green-backed Trogon (*Trogon s. strigilatus*) captured by Barbara Snow at the Snow's bandin station, was force-fed, at some cost to our finger for four days before it began eating captive ra tions. Charles Cordier has related that he ha found it necessary to force-feed some birds mor

than 40 days to teach them to accept captive foods. All of us who have travelled in foreign lands where exotic foods confound the palate will appreciate the problem, but why some species or individuals accept substitute foods so much more readily than others is a very interesting problem. Of course, the foods we offer may be closer to the natural diets of some species than of others, but this is not the entire answer.

A fascinating side issue which took my interest lay in the minute white spots in the eyes of certain of the leaf-green "female" Golden-headed Manakins David Snow was banding, and to which he had called my attention. Zoo experience indicated that these birds might well be immature males. I was especially pleased, therefore, to trap a fine series that showed, as Will

Beebe was quick to note, a strange asymetrical distribution of tiny eye spots in some birds, larger blotches in others, and, in one specimen, a complete ring of spots encircling the iris in one eye but only small spots in the other. Thus we had a fine developmental sequence before us, leading from the brown iris of the female or immature male to maturation of the adult male with his completely white irises.

A few days later Henry Fleming helped me load the car and we headed up the Arima Valley towards the pass over the Northern Range. At the pass, one may gaze south over the jungle-clothed mountains to the lowlands leading to Trinidad's Middle Range, or north towards the West Indies and the Atlantic Ocean, and in this area we found a trail called Andrew's Trace. Following the trace past slender tree ferns below immense trees festooned with epiphytes, we came upon two small houses and noticed we were near a natural flyway: a low spot where birds wishing to cross the ridge came close to the ground, and whose attractiveness to birds was enhanced by a small stand of Guava trees laden with fruit. Several species of tanagers were feeding there, along with honeycreepers and bananaquits. Hummingbirds, incredibly abundant, zipped back and forth across the ridge, and the Tufted Coquette, most exotic of Trinidad hummingbirds, was among them. We realized what a find we had made, and raced back to the car to get a mist net and string it between the aluminum poles. Henry at one pole and I at the other, we trudged back to the flyway with the intention of forcing the poles into the soil on either side of the avian freeway. As we walked along, precisely thirty feet apart, with the net strung invisibly between us, I could not help but remember cartoons of glaziers in seemingly strange but oriented postures, carrying a long invisible pane of glass! At the proper place we stopped and found, to our consternation, that the soil was so hard we could not possibly force the poles into it, and as we struggled with this difficulty, a Red-headed Calliste, its brick red head resting upon a glossy coat of feathers so verdant it put the tropical foliage to shame, dropped easily into the net. We could not, of course, allow the nets to fall to the ground, yet we still had no way to support the poles so that we could remove the calliste, and we gazed at each other helplessly for a moment before the owner of the nearest house realized our predicament and came to our aid. As he held the pole I extracted the bird and raced back to the car to place it in a holding box. As I returned, I found another bird enmeshed, and thus we captured one tanager after another until we had as many as we could use. In addition, several manakins and hummingbirds were ensnared and released. Certainly, this was an example of the sort of good fortune which adds excitement to collecting, for the next day we captured not one single bird in the same area! The weather had changed and the Guava trees were depleted.

The Tufted Coquettes which we had noted earlier hit our nets on several occasions, but each time, after an almost imperceptible pause, flew on. These tiny hummingbirds, though wonderfully ornamented with great neck fans of elongated emerald green-tipped feathers, are so small they could pass right through the netting. This was the only area where we saw them frequently, and we knew we would have to catch one here or do without, so a few days later we made a set with two nets, one behind the other. In short order we captured two Hairy Hermit Hummingbirds and a Common Emerald, species we did not need for the collection. A Coquette was feeding nearby, and, as I watched, it flew directly to the nets and stopped so quickly that I could almost imagine the squeal of air brakes. It was a male, just what we hoped for, but it hovered, then darted over the net and disappeared. In the meantime I heard Peter calling. He had captured a Black-headed Honeycreeper and was having difficulty removing it from the net. When we returned to the hummingbird set I noticed a tiny leaf had blown into the middle tier and went to remove it. It was a magnificent male Tufted Coquette. I removed him from the net and plunged his beak into a vial of artificial nectar, but he would not drink, so I placed the tiny bill, not half an inch long, between my lips and sucked gently until I could feel his tongue protruding, then quickly replaced his beak in the nectar. He drank greedily and, like most hummingbirds, adapted wonderfully to his new surroundings when I placed him in a travelling cage.

During the first two weeks at Simla, not a bellbird was heard, although I was constantly assured they were common and "ought to be calling, but the season is very dry." David Snow had found some nestling Jacamars for us, which were growing wonderfully on a diet of mealworms, grasshoppers and katydids, and this relieved us of a part of our collecting schedule. So, borrowing Will's high-powered telescope, I stole off to peer about for the Mossy-throated Bellbird.

Driving along one road after another, to areas indicated by Will or Henry, I found the Bellbirds were calling. The powerful, immelodious *kokkk* followed by *kong kong kong kong kong kong* could be heard in several valleys, for it had finally rained, but nowhere were the

birds calling close to the road. At several place where a good view of the forest could be ob tained from the high roads, I set up the telescop and scanned each and every top of the huge tree in the lower montane rain forest below me, to n avail. Although I could hear the birds well an tried to triangulate their positions from a serie of points above them, they might as well hav been leaves for all my searching. Toucans caciques, screeching parrots and even dartin hummingbirds could be seen, but no bellbirds Furthermore, the areas where bellbirds seeme most common also appeared most impenetrable Steep sheer banks dipped down into distant val leys with no trace or trail to follow. Finding much less trapping, the birds under such condi tions was out of the question. Henry Flemin had told me that bellbirds could often be hear calling along the Cumaca Road northeast of th little town of Valencia, and, eventually I mad my way there. Driving, then listening, I foun a point where the voices of seven separate bird could be distinguished, and through great goo luck a faint trail led down from the mountai into the valley from which the voices emanated Armed with binoculars, I took to the trail bu

soon branched off on a faint path which seemed to lead directly into the center of the bellbirds' detonations. Soon I was close and could detect a new quality in the calls and actually feel the shock of each vibration, though I could not see the vocalists. Two were apparently near at hand and I struck out for the nearest, pushing through dracaena-like plants which threw thick leaves out in clusters perhaps three feet from the ground and were supported by improbably slender stalks. In the course of the next few hours it rained three times, so that the forest was saturated and a mist arose from the forest floor which added greatly to the beauty of the jungle and detracted not at all from the mystery which still surrounded the calling bellbirds. Amazingly, the birds had not paused in their calling throughout the thunderous downpours, and during momentary cessations in the rain I made hurried advances toward their sounds. Attempts to keep dry were abandoned as hopeless, but the temperature was so pleasant that the thorough soaking was not in the least uncomfortable. While the vegetation was wonderfully luxuriant, the ground cover under the huge Mora trees was not nearly so dense as that in many forests in the northeast United States. Then, too, it was not difficult to avoid occasional patches of razor grass or spiny palm trunks so that this jungle was a comfortable as well as fascinating place where one did not have to worry about poison ivy or battle nearly as many mosquitos as we would expect up north. Finally, I crossed a small stream and as each terrific vocal explosion pounded down upon me, realized I was directly under a bellbird, though I could not localize its source and in vain scanned the tree where I knew the bird must be. I covered one ear and moved off to one side then the other, attempting to fix the location more precisely, but the longer I listened the more difficult it became to detect the caller. At last a flash of silvery gray revealed the bird above me and a few minutes later it flew and I marked the way it went. The next bird proved easier to find, for instead of calling from a huge 100-foot Mora, it was using a slender Cecropia no more than 25 feet from the ground. I was uphill from the big cotinga, but after a slow and cautious stalk found myself within 35 feet of the bird. By 5:30 p.m. I had filled my field book with notes and sketches, knew the calling postures and display of the

The Tufted Coquette is the smallest and most ornate of the hummingbirds of Trinidad — smaller, indeed, than our native Ruby-throated. Many times Coquettes literally flew through the mesh of the net and finally a special set of two nets was rigged and this lovely male was captured. Its throat is an iridescent green.

Small but beautiful — a pair o Rufous-tailed Jacamars, distan relatives of woodpeckers. These are the first we have exhibited and it is probable that they are the first shown in North America

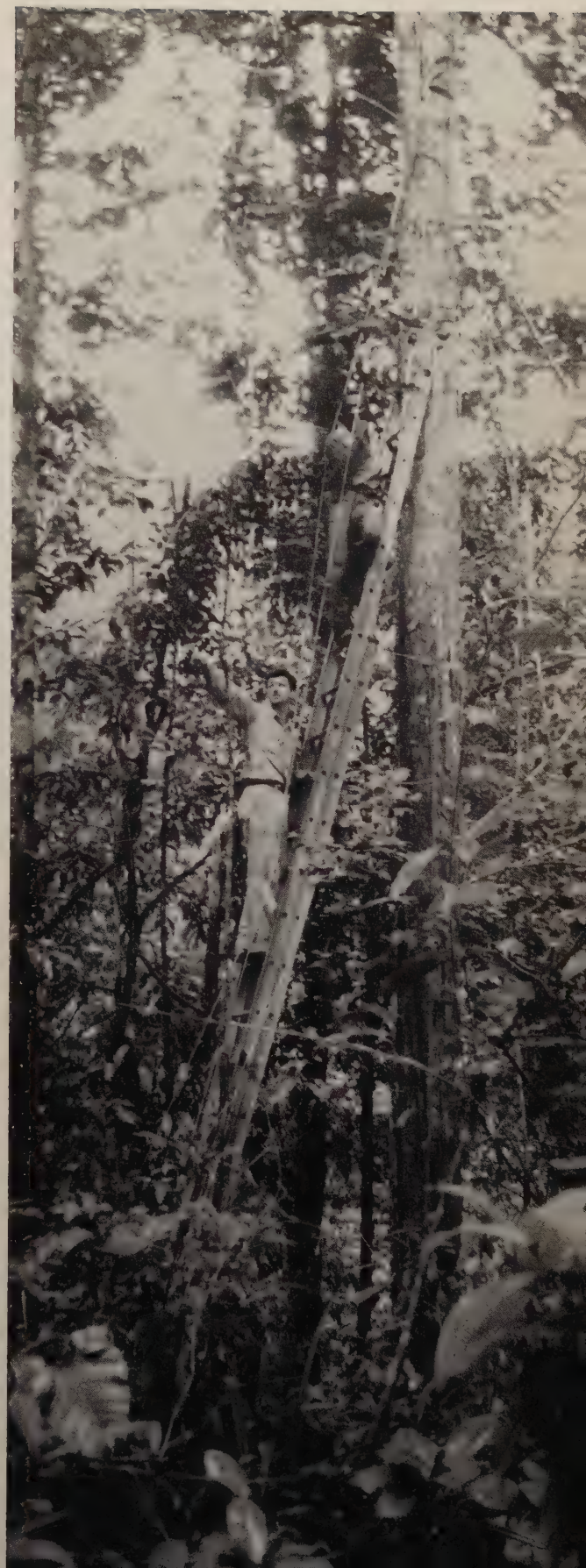
Mossy-throated Bellbird, and had taken its first photograph alive — poor though the picture was because of the subdued light of the forest. Succeeding days filled out these observations but could not exceed the thrill of that first day, the first sight of the living bellbird and the pleasure of sharing with it alone the knowledge of how it displayed and called. Basically, the display calling and posturing was much like that of the Bare-throated Bellbird. Cocking the body tensely and twisting itself, with its long axis parallel to the perch, the Mossy-throated opens its huge mouth widely, then suddenly jumps or, sometimes, runs with vibrating wings up the perch opposite to the direction which it was originally facing. As it jumps and twists off the perch it emits the explosive *kokk!* Often, just after returning from a trip down the valley for food (we could surmise this, for it regurgitated large fruit seeds at intervals), the bird would perform one jump-twist after another between two branches perhaps three feet apart. At times the dance became almost manakin-like. At other times, the bellbird sat emitting the loud, explosive *kokkk,* then *kong, kong,* making no moves from an upright position. We soon learned that the birds were not confined to one calling perch, as had been previously supposed; in fact each bird observed had at least two, and of the four bellbirds we watched most closely, each had three favored perches. I had now decided to make a real trapping attempt and tied a long slender leaf to the base of each tree which held a calling perch. All the next day was spent watching the bellbirds, one specimen in particular which appeared to fly through the most accessible area. Soon our observations revealed that it would disappear for as long as 4½ minutes some time between 11:30 and 1:30 o'clock, that it always came back from the same direction, and usually flew to its calling perche from a flight line of a particular height between certain trees. I watched, and set imaginary nets After I had seen the Mossy-throat fly into my fancied traps three times, I climbed back up the mountain to the car and returned to Simla.

The next day, in full collecting regalia and accompanied by Simla's Foreman, Sunny Ram

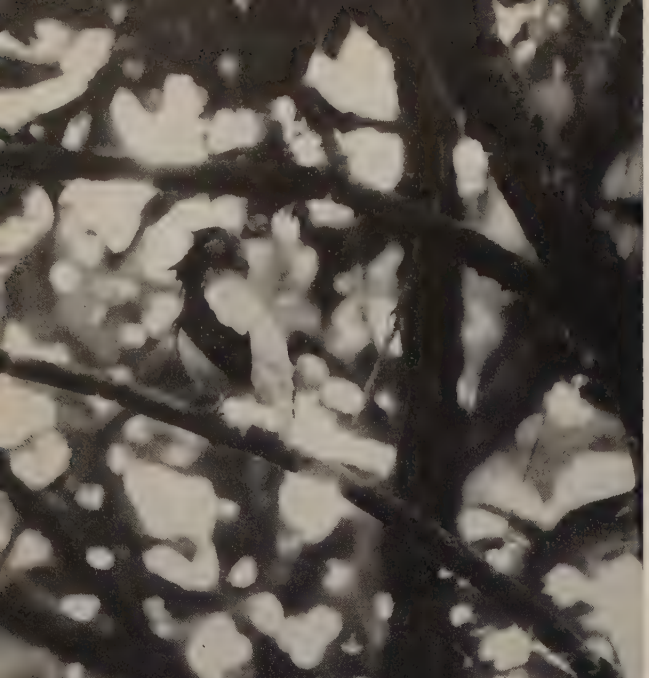
Lal, and Carpenter, Armstrong, as well as my helper Peter, carrying an aluminum extension ladder, I arrived at "Bellbird Valley" prepared to make a first trapping attempt. The lowest calling perch was within reach of our telescoping poles and here we set our first net, actually two nets, one above the other, so that we could not miss the bird should it change the inclination of its arrival flight.

Carrying the aluminum ladder down into the valley over the twisting slippery path had required real determination, but the ladder proved its value when it was erected at each of our

y day a Mossy-throated Bellbird across the bed of this stream here Mr. Conway sat quietly for s, charting the flight path in aration for putting up the net.



A light-weight metal ladder was of the greatest value when it came to attaching a net high on the trunk of a mora. Nets put up here finally resulted in the bellbird's capture.



A Mossy-throated Bellbird calling, high in tree in the Trinidad forest. Mr. Conway took the picture, which is probably the first one ever made of a Mossy-throat in its habita

previously-marked trees, allowing Armstrong to drive and bend over thick nails into the bark of the trees at 50-foot heights. Strong cord was threaded through the bent nails to result in a flagpole-type arrangement which made it possible for us to attach our nets to the draw-cords and pull them from the ground high into the trees across the bellbird's flyways. We completed four sets by 11:30 a.m. Gathering tools and climbing equipment, we retired a safe distance from the nets, watched with binoculars and talked in low tones. Though all three of the crew had lived in Trinidad all their lives and had heard bellbirds as long as they could remember, each admitted he had never seen one at close range, and each had been taken aback by the grotesque appearance of the bird as it watched us from nearby branches while we worked on devices to trap it. For my part, I worried constantly that we might have frightened the bird so that it would not return, though it certainly seemed more curious than afraid. Armstrong related the local story that the bellbird or "Campañero" had argued with a blacksmith over which could deal the strongest blow to an anvil. The bellbird won and thus attained its voice! Actually, the voice of this species is not bell-like and the anvil-percussion simile is not a poor one.

Suddenly the bird reappeared on the scene. I flew to its highest calling perch and began t bombard us with its calls. From this branch, i our calculations were correct, it should fly to it low perch where two nets were stretched betwee the aluminum poles, and we should have a bel bird. However, should it, by some mischance miss the nets in front of the low perch, it shoul still have to fly past three other sets across th paths to its other perches and its usual feedin route. A female appeared and the male gav chase, both headed directly to the low perch. A the last moment perhaps a ray of sunlight re vealed the net or a breeze rippled it, for the mal swooped under it and the female flew above i to land on the calling perch. We watched in

positive agony of misgivings, wishing at one an the same time that we had placed the nets bot lower and higher. Before we could begin "pos mortems," however, the female flew out, awa from all of our sets, and the male began calling Then, as we watched, the male slipped off th perch and glided neatly through the ten-inc space between the upper and lower pole nets We scarcely had time to feel disappointmen when a fearful growling came from our highes tree net. We charged down the mountain side brushing through razor grass as though it wa eider down and leaping over fallen trees with speed that would have done credit to a herd o Impala. Hanging neatly, but far from quietly directly in the center of the net was the bellbird Sunny and Armstrong raced to the pulleys an began a slow, cautious lowering of the net whil I waited below. Spectacular though he had bee when calling, nothing could compare with th appearance of the Mossy-throat in the hand. Th sense of touch, for none of us could resist a gentl tweak of his magnificent beard, added the fina dimension to our conception of the bird and in creased our wonder over its countless unsee antecedents and their still inexplicable develop ment of a "mossy" throat. It was only 1:30, barel two hours since the nets were first raised.

New and Lively—

THE MONKEY HOUSE

by WILLIAM BRIDGES

THE BRONX ZOO has a Monkey House again! After almost nine years of disuse, the old Primate House (built in 1901) has been entirely reconstructed except for its four walls, has been rechristened as the "Monkey House" and on Thursday, May 28, was opened to the public after a preview for Members of the Zoological Society on the previous day.

Inside the tile-lined, aluminum-railed hall are 20 compartments for 47 monkeys of 27 species — a fine and representative collection containing a number of rarities. Five additional outdoor compartments on the east side of the building will be in operation in another week or two. Eight of the larger compartments are fronted with electrified glass that delivers a mild shock when touched (on the monkeys' side only) and acts as an efficient barrier for even the large and powerful Mandrills.

Gradually during the spring the monkeys have been introduced to their new home and all have been "in residence" long enough to become quite at home on the variety of climbing and exercise devices installed in their compartments.

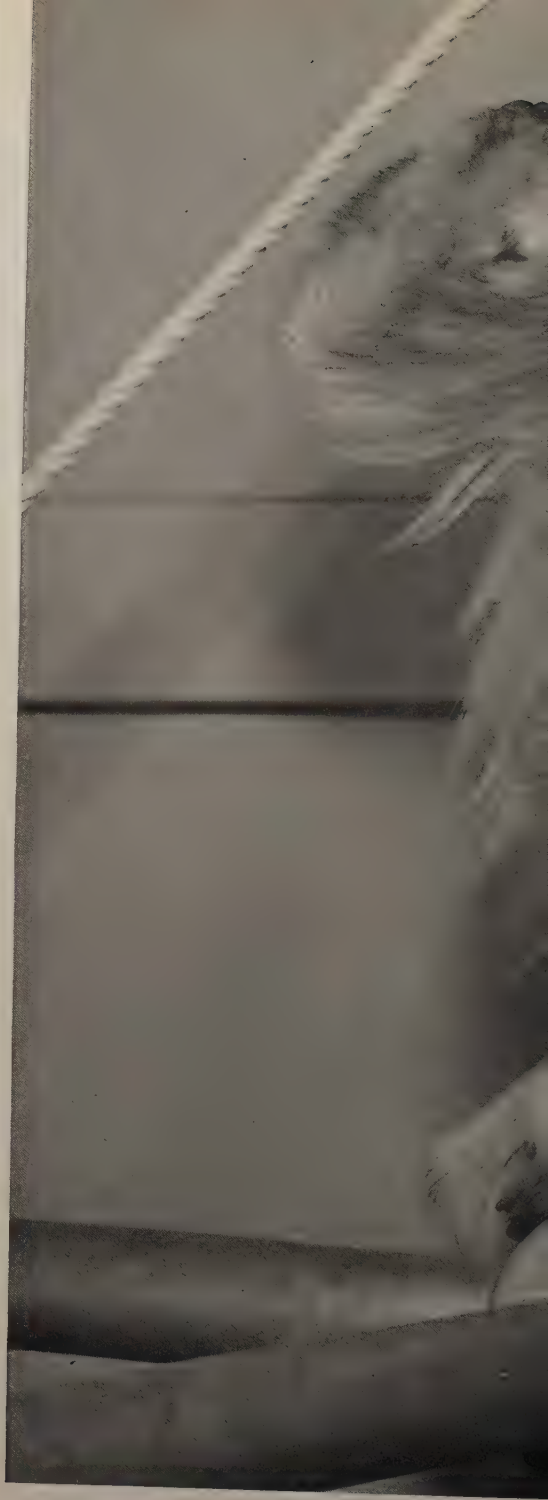
The cost of reconstruction was $350,000, paid by the Zoological Society. A new roof and floor were provided by the City at a cost of $84,000. Edward Coe Embury was the architect.

MANDRILL

This face-splitting yawn is not a yawn of boredom, but a typical Mandrill gesture that makes the animal's armament of teeth apparent to all. About a tenth of a second after Staff Photographer Dunton took this photograph, the Mandrill sprang sideways onto the swinging arm of his perch and sent it spinning while he leaped to the floor of the compartment. The revolving arms of this play device were installed with some misgivings; if one of the two Mandrills in the compartment made the arms swing, might the other animal be struck by them? It was a needless worry. The female Mandrill seldom plays with the arms and stays well out of the way when the male gives them a whirl. He seems to find much pleasure in making them swing and has developed a polished routine of leaping on them at the most effective spot.

SPIDER MONKEYS

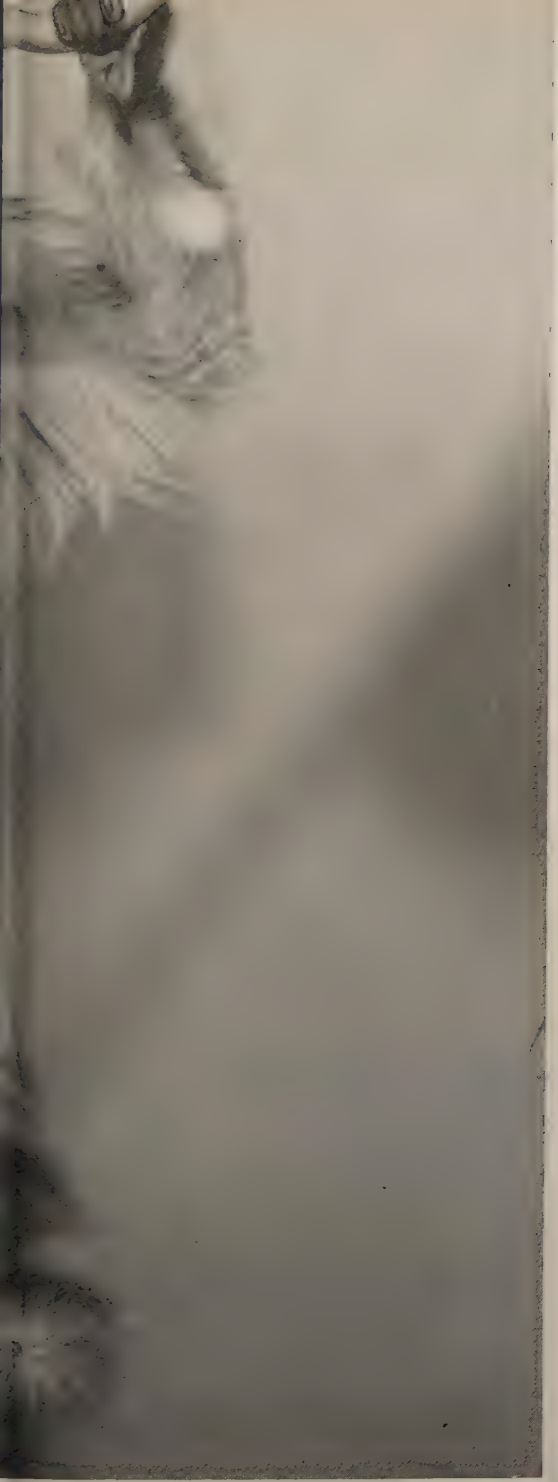
The principle of the wheel was presumably totally unknown to these Spider Monkeys in the wilds of their native South America, but this easily-turning aluminum wheel has become a source of great interest and enjoyment to the Spider Monkey group in one of the large central compartments in the new Monkey House. For the first few weeks after they were introduced to the wheel they were suspicious of it and its slow turning when one of them climbed on it made them leap to the floor or the ledge behind. But gradually they came to accept it and realize that it meant them no harm. Now they swarm over it all day long, hang from it by their tails, and occasionally one will allow himself to ride full circle. The best thing about it, from the Spiders' standpoint, is that there are plenty of secure tail-holds.



HAMLYN-L'HOEST HYBRID

Here's a rarity that is only a rarity by accident – a hybrid between a male Hamlyn's Monkey from tropical West Africa and a female l'Hoest's Monkey from the Belgian Congo. The youngster lacks the strong white streak on the nose that is characteristic of Hamlyn's.

Photographs – despite the belief that the ca
of the Bald Uakari, for instance. It appears
seem unnecessarily long and ready for use
in the collection, full of curiosity about th
its movements, but always coming back to



ertheless be misleading. Take this picture
animal, to say the least – and those teeth
ne of the most endearing little monkeys
rtment, volatile, brisk and sudden in all
le outside. We have two Red Uakaris, also.

SILVERED LEAF MONKEY

These are the first of the Silvered Leaf Monkeys we have had. They came from southern Sumatra and the nearby islands, and are fairly uncommon in collections. Our young pair has the advantage of being extremely lively and active and they have plenty of room to climb.

IGUANA ROUND-UP

By CHARLES M. BOGERT

THERE is a handsome young Green Iguana in the Bronx Zoo's Reptile House and I happen to know that some rather special arrangements have been made for its comfort. Periodically it is bathed in ultra violet light; it may bask at will in the warmth of infra red rays; even the floor of its compartment has a built-in temperature gradient that ranges from a cool 80 degrees at the back to a warm 100 degrees at the front.

These are more than amenities; they are almost necessities for this big tropical lizard. But they are not important to all lizards. In another compartment not far away, a Blue-tongued Skink flourishes with merely an overhead incandescent light and the slightest of temperature gradients in the floor. The skink basks on occasion, but unlike the Green Iguana, makes relatively little use of radiant heat to keep its body warmer than the surrounding air.

Practicalities of reptile management such as these are based both on experience and on research in the heat-regulating mechanisms of reptiles. We know *some* things, but there is so much more we would like to know.

For instance, why are the world's biggest lizards largely restricted to the tropics? Lizards lack the internal heating mechanisms of birds and mammals and their activities depend on heat absorbed from external sources – directly or indirectly from the sun. Thus, most lizards bask, at least on occasion. Through their behavior and pigmentary changes, many small lizards exercise astonishingly precise control over their body temperature.

Since size and shape obviously have some bearing on temperature control in lizards, it would be interesting to know whether it is their greater bulk that confines the larger species to the tropics. Furthermore, are these big lizards actually different from the lizards of temperate climates i their heat requirements? What extremes of he can they tolerate, and how important is behavi in regulating their heat intake?

After thinking about such matters a long tim I recently had the opportunity to find a few a swers, by studies in the field. At least thirty spec mens of a large lizard were needed and the Gree Iguana, *Iguana iguana,* was the obvious choi among the lizards of the New World tropics. reaches a maximum length of at least 5½ fe and a weight exceeding 13 pounds. It rang northward along the Pacific coast slightly beyon the Tropic of Cancer, so it can be reached by o of Mexico's new highways.

Thus it was that on a propitiously clear mor ing a few months ago my wife and I found ou selves in the thorn-covered scrub near the settl ment of Peñitas where the highway bridge cross the San Pedro River some 750 miles below th border. Luck was with us. In the first half-ho I dropped a noose over a half-grown Gree Iguana's head and after a considerable strugg pulled it out of the tree where it had bee perched at a height of about 15 feet.

As the morning wore on we acquired sund local helpers and by late afternoon some five six iguanas were extracted from the dry, thor covered branches, evidently cut from trees in a adjacent clearing, that lined the river bank. B they were all juveniles and I could well rec that the first young ones I had ever seen were similar surroundings along the Yeguare River Honduras. Adult iguanas spend most of the time in trees, although it is not unusual to s them on the ground. The same iguana is oft seen in the same tree day after day, and it a pears to be exceptional for an adult to mo Juveniles may venture into the larger trees, whe they are not so easily seen. I am not sure wheth

ney restrict their foraging to the tangled under-rowth of roots and driftwood along river banks, ut that is where I more often saw them.

If our investigation was to reveal why the truly rge lizards are restricted to tropical environ-nents, however, we needed larger iguanas than ny thus far obtained. As we wound up our fternoon's work, therefore, I asked where we night find Green Iguanas of greater size. Our as-istants pointed toward the foothills. They said rge iguanas lived in the large willow trees grow-ng along the river.

"*Muy bien,*" I said, "I'll be back tomorrow, round ten o'clock in the morning. I'll meet you nere. I will buy as many as you can obtain." There was not the slightest intimation that they expected to be paid for their efforts, but to offer nore inducement I handed each of them some noney, adding that I would pay five pesos for each iguana they caught. I did not realize it at he time, but five pesos was half the amount they isually received for a day's labor.

The following morning four men were awaiting our arrival and on the trail beside the now-drying river three boys joined us. The youngest of the hree looked as though he might be too small to maintain the pace of the men and older boys. But, as we rapidly moved on toward the large willows, I was astonished at his ability in climbing fences and jumping gullies. He was not so talkative as his companions, who called him "Tarasco" and informed me that he was seven years old. He promptly corrected them, saying that he was eight, and his name was Elmiro Corona. With four men and three boys we seemed well prepared to flush iguanas from the willows. Overhearing hasty conversations mentioning "*iguanas pintadas*" and "*cinco pesos*" when the men trailing behind us met friends along the way, however, we realized that iguana hunting was about to become a popular sport.

By the time we reached the first large tree, over a dozen assistants followed us, with Elmiro racing ahead like a bird dog. He paused just long enough to scan the branches of one tree before going on to the next. It was no great surprise when he yelled "Iguana!" and pointed, but I was astonished to find how difficult it was to see the lizard. I stared for several seconds, I am sure, before I could discern the large reptile. With its belly flush against a limb, the spines down the

This male Green Iguana has its throat fan fully distended while threatening another male. Several males often inhabit a single large tree.

All photographs by the author.

center of its back mingled with the twigs ar
leaves and the irregular bands of green and brow
on the body blended with the background, almo
completely obscuring the outline of the body.

Impressed by the iguana's camouflage, I w
still staring when clods and sticks began to ra
around the creature. Well protected by the fo
age, however, it never budged. I feared at fi
that our helpers were trying to score a direct h
on the lizard, but it turned out that they we
hoping to induce it to move down the limb, or
"jump" from the tree. One of the older boys trie
to climb the trunk, but the first branches we
some fifteen feet above ground and he abandone
his efforts. Then Elmiro appeared at the foot
the tree. Spreading his arms to hold himself
place while he dug his toes into the bark, h
started his ascent of the trunk.

Our bird dog of a few minutes ago now seeme
transformed into a measuring worm. Elmiro alte
nated his grip, and pushed as he dug into th
bark with his toes or the sides of his *huarache*
He made fair progress, despite the overabundanc
of encouragement and suggestions being shoute
at him. Above the first limbs large enough
carry Elmiro's weight two large branches e
tended from the main trunk. The iguana was
one of these, but as Elmiro approached th
branch, the lizard turned its head. Seeming
aware of impending attack from below, it bega
to shift its body, turned around and descende
the branch with the utmost deliberation. Whe
it reached the main trunk it started upward, mo
ing fast enough to keep just beyond Elmiro
grasp.

Neither the lizard nor the boy moved rapidl
for each had to weave his body through the twi
and limbs that projected. But the iguana had th
advantage in size, and from time to time
paused, waiting until Elmiro came closer befo
it resumed its retreat. The tree probably was n
more than fifty feet high, but it began to sway
the breeze and plainly Elmiro entertained dou
that the branches would support him muc
longer. Above him the smaller limbs began

***Elmiro Corona holds a large female iguana h
was instrumental in capturing. This lad w
adept at climbing trees and flushing iguana
to the ground where they were usually caugh***

bend under the weight of the iguana. Elmiro made a vain effort to reach its tail, but as he extended his hand the iguana abruptly dashed forward, on out beyond the limbs and into space.

As it landed splashing in the pool beneath the tree "all hell broke loose" but not quite in the manner described by Milton in *Paradise Lost*. Men and boys scrambled down the bank, laughing and shouting as they waded into the pool, or ran around one end to get on the other side. The iguana, propelling itself with its tail, swam toward the distant end of the pool, its head above the water. An older man waded out to intercept it, only to see it duck its head beneath the surface as it veered away from him. It reappeared, and the man splashed after it, frantically shouting "*Cinco pesos! Cinco pesos!*" He managed to seize the lizard by the tail, but by then the water was nearly three feet deep, and being unable to raise the lizard above the surface he quite needlessly became frightened and let go.

Again the lizard submerged, coming up near the bank where it scrambled out on land and took off in the tangle of vegetation growing between the pool and the bank. All of us now joined the chase, the poor iguana ducking in and out, wherever it could find an opening, and reversing or changing its direction every time we confronted it. I fully expected it to find a hole in the bank where it would disappear for good, but whether from exhaustion or confusion — at that juncture I could sympathize with it on either score — it ran close enough to one of the men, who dived forward and came up from the foliage with a firm grip on the middle of its tail.

Holding it at arm's length to avoid the stout claws, the triumphant captor came toward me, grinning as he asked, "*Vale más que cinco pesos? Es grande!*"

The iguana was an elegant example of his species, at least four and a half feet long, more brown than green, but with the gray color of the head conveying the impression that it was grizzled. The jowls sagged, seemingly protected by an enormous scale that stood out below the less conspicuous eardrum above the level of the mouth. Surmounting the crest of the body, the enormous reddish-brown spines were, understandably, bent in various directions, lending the lizard an air of profound disarray. Three spines projected from the snout, and the great dewlap suspended from the throat was edged with scales resembling teeth on a saw. Small wonder that dealers in the United States offer the bizarre creature for sale as a "Chinese dragon!"

Following our examination of the iguana, we placed it in a sack. I paid the captor five pesos and added a bonus. Then I rewarded Elmiro for his important contribution to the success of our endeavor. We continued along the river bank, repeating the general procedure as Elmiro induced one lizard after another to abandon its tree and take to the water or, in some instances, to the ground. Within less than a hundred yards we flushed seven large iguanas from the willow trees, but two made their getaway. One of them fled across the open river bed, disappearing into a thicket a hundred yards away on the opposite bank. The other one may have gone into a hole in the bank, or it could have been one of the two iguanas we found in the next tree. Once flushed, however, iguanas show little inclination to seek safety by returning to the tree tops.

This gave us a fair start in assembling the 30 iguanas we needed. In fact natives with iguanas already captured were waiting for us on subsequent trips from Tepic. Within a few days we had all the iguanas we dared try to transport. The larger individuals remained in the sack acquired earlier, but we placed the smaller ones in two baskets. With these on top of the load of what seemed like a ton of luggage, collecting and recording equipment, we headed for the San Diego Zoo in California. There the Curator of Reptiles, Mr. Charles E. Shaw, had generously indicated his willingness to allow us to house our iguanas in an open enclosure for further observation.

What had we thus far discovered about the heat requirements of Green Iguanas? In Nayarit their body temperatures during the latter part of February average 92.5° Fahrenheit, approximately the mean level maintained by small relatives of the iguana in the United States and Mexico. It was also evident that Green Iguanas bask, for their bodies invariably were warmer than air, sometimes exceeding air temperatures by 20 degrees. During the period of our work air temperatures near Peñitas, at our level — we could not actually record the temperature of the air near the iguanas — ranged from 73° to 93° F.,

The adult female Green Iguana is smaller and more graceful than the male, lacks his sagging jowls, and has proportionately smaller spines and dewlap. This one has lost her snout spines.

while bodies of the iguanas lay between 85° and 103.6° F.

In common with most arboreal animals, Green Iguanas spend the night in trees. Early one morning after we had spent a chilly night camped in the *marismas* in a fruitless effort to record the response of a *tigre* or jaguar to a "jaguar caller" employed by Mexican hunters, we observed an iguana high up in the branches of a gigantic *guanacaste*. It was probably the largest Green Iguana I ever saw, but we failed to catch it, anxious though I was to obtain its temperature. In our camp a mile away it could scarcely have been warmer and air temperatures there dropped to 48° F. Any self-respecting lizard in temperate climates would have sought cover, but this one almost certainly remained exposed to the chilly air, though perhaps hidden in the foliage.

So Green Iguanas remain abroad at temperatures that drive most smaller diurnal lizards to cover. They also seem unable to control the heat level of the body with the precision now demonstrated for smaller lizards. In the enclosure in the San Diego Zoo iguanas permitted their bodies to reach 108° F., but at other times they were active at 80° F. Could they withstand 115° F., the body temperature voluntarily tolerated by the Desert Iguana, *Dipsosaurus,* on rare occasions? To answer this question we took Green Iguanas to a warm area in Coachella Valley, at the edge of the Colorado Desert.

The day we carried out the tests air temper tures fluctuated between 103° and 108° F. W liberated iguanas in a large walled enclosur with shade available less than ten feet away. B chance we began the first test with an iguana the same temperature as our own, 98.6° F. Usin a special thermometer, we recorded the lizard temperature at intervals, finding that within 1 minutes its body had reached 115° F. At th level it began to pant, with its mouth open. The it turned to face the sun and crawled a few fe toward the shade. We fully expected it to co

The profile of an adult male is more bizarr This picture shows part of the dewlap and th distinctive scale at the angle of the lower jav Here the spines on the snout are apparen

tinue on its way, stopping only when it reache cover. Instead it remained where it had stoppe in full sunlight, panting more furiously with th mouth opened wider, as the seconds ticked b Thermometer readings revealed the value of th panting, or respiratory cooling, an automatic r sponse to overheating in many animals but abse in some lizards already tested. Evaporation moisture from the membranes of the mouth an lungs in this instance lowered the temperatu slightly more than a degree within a two-minu interval. Of equal importance, there was no pe ceptible increase for three minutes.

The lizard still made no effort to escape the d rect rays of the sun. Ten minutes after it starte

o pant, erratic movements of the head marked he onset of heat rigor, with the muscles of the hroat and chest becoming paralyzed as all signs f breathing stopped. Two minutes later no sign f life could be detected. The poor iguana exeeded the limits of endurance when it allowed ts body to reach 116.6° F., despite the easy accesibility of shade that could have saved it. Other Green Iguanas behaved in a similar fashion when exposed to nearly identical conditions.

Is it a matter of the iguana's stupidity? Not exactly. Behavioral responses, or patterns of beavior, are inherited, just as structural characterstics are inherited. Lizards inhabiting any region have been subjected to natural selection over countless generations. During millions of years they have become adapted for particular habitats, with selection affecting each population. Indirectly selection also affects the individual, each of which is endowed with the more obvious physical characteristics suiting it for survival. However, the interplay of environment and heredity implies something more. Each individual functions as an integrated whole. It follows that structure, physiology and behavior must be coordinated if they are to have survival value. The adaptation of any lizard to a wide range of environmental conditions would necessitate an interaction of behavior, size, shape, pigments and other characteristics involved in the regulation of heat intake.

Iguanas begin to pant when their body temperature approaches 115°. Rapid breathing with the mouth open carries off heat lost by evaporation from the moist air-passage lining.

The Green Iguana is well adapted for survival in the forested lowlands or foothills where it lives. It is never subjected to temperatures below freezing or to the heat characterizing the middle latitude deserts in summer. Dry, arid conditions with hot summer weather prevail in Sonora 525 miles north of the areas known to be inhabited by Green Iguanas. Guaymas is roughly the southern limit of the Colorado Desert, and Green Iguanas may occur even closer, perhaps within 200 miles. Lizards described by an informant in such detail that they could scarcely have been anything but Green Iguanas, had been seen, he insisted, not far south of Alamos in the barranca region of southern Sonora.

This remains to be verified, but other reptiles largely restricted to the tropics do live in the barrancas north of the Tropic of Cancer, even when they are absent on the narrow coastal plain. Alamos approximates the southern limit for frost, and in regions farther south temperatures below freezing rarely if ever occur in the coastal lowlands and foothills. The coastal area receives less rain, and there may be a thermal belt in the moist barrancas where the huge lizard could survive. From what we know of the Green Iguana's habits and temperature tolerances, however, this would be the northernmost locality where it could be expected. A Green Iguana was inadvertently overlooked in the San Diego Zoo when others were moved indoors to protect them from a drop in temperature predicted for the night. It survived exposure to near freezing, if not freezing temperatures. Mr. Shaw found it the following morning, in a state of cold narcosis, hanging by one claw from the tree in which it had hidden. Prolonged exposure would surely have killed it.

In common with Galapagos Tortoises and probably many other large reptiles of the tropics, Green Iguanas lack behavioral responses suitable for survival in regions where they would be exposed to pronounced seasonal changes in temperature. Does bulk alone preclude their acquisition of suitable combinations of structure and behavior to allow them to compensate for seasonal changes outside the tropics? We cannot answer that question with certainty, but circumstantial evidence would suggest that it does.

The Long-Jawed Wrasse

A Fish with "Personality"

by JAMES W. ATZ

FISH FANCIERS often assert that each fish in a home aquarium behaves as an individual and has a personality all its own. Professional fishmen working in hatcheries, laboratories or public aquariums are inclined to regard this anthropomorphism with condescension or even contempt, but every so often a fish with such unusual behavior turns up in their collections that they, too, begin to talk about its human characteristics, give it a pet name and come to regard it from the sentimental amateur's point of view.

We recently received one of these unusual fishes at the Aquarium. It was not long before some of the newer tankmen were calling it "Oscar," a whimsy that caused some of the olde and more matter-of-fact tankmen to shake the heads – although as much in admiration of th fish as disapproval of their fellow workers. Th fish had been received as part of an exchang with the Steinhart Aquarium of San Francisc At first glance, it appeared out of place alongsid the brightly colored parrot fishes, surgeon fishe and squirrel fish that had accompanied it on i airplane flight from the west coast. In fact, wondered why Dr. Earl Herald, Curator of th Steinhart Aquarium, had chosen to send a specie as dull-colored and nondescript as this one, bu a closer look, for purposes of identification, r

ealed an important peculiarity: the structure of ts jaws, which are arranged in a fashion different rom that of any other species of fish. At first we ould appreciate this fact only in an academic way; not until later, when we saw the fish in action, could we fully understand how marvelous a mechanism it really is.

Reference books revealed that the scientific name of the fish is *Epibulus insidiator;* that it belongs to the large Family of wrasses but is the only member of its genus, being separated from all the other wrasses by virtue of its unique jaws; and that it inhabits a wide area of the Indo-Pacific, from Zanzibar and Mauritius east to the Riukius in the north and Australia in the south. Despite this wide distribution and the fact that it has been known to science for nearly two hundred years, nothing appears to have been recorded about its life history except that it reaches a length of at least 13 inches.

For some time our Long-jawed Wrasse (the appropriate popular name assigned to it by Dr. Herald) gave no indication of unusual behavior, either associated with the structure of its jaws or otherwise. It hid in a corner of its tank and responded to all attempts to coax it out by retiring even further, if possible. This is normal for a fish that has just suffered the stress and strain of half a day or more in a small, jostled plastic bag half filled with water and now finds itself

ightning-like rapidity the Long-jawed Wrasse received at the Aquarium has snatched a of worm from the fingers of Tankman Dols. amera caught it with its jaws half extended.

in a strange tank with conditions of temperature and water chemistry also inevitably changed from those to which it was accustomed. Nevertheless, we were concerned because our Long-jawed Wrasse was distinctly "hollow bellied," a sure sign of starvation. We tried several kinds of food to no avail and finally added some live brine shrimp to the tank. These tiny crustaceans seemed entirely too small for an eight-inch fish, but we have learned that it pays to try everything when enticing specimens to feed. In this case, the improbable proved to be the solution to our problem; the Long-jawed Wrasse started to eat — just a few brine shrimp at first, and then a small Guppy or two. As these tidbits stimulated its appetite, or it grew more at home in its new surroundings, the fish ate larger and larger prey until it was swallowing two-inch Swordtails and Killies without hesitation. Cockroaches thrown on the surface of the water were also snapped up with apparent gusto. Soon freshly-killed food, as well as living prey, was being taken, including bloodworms, earthworms, grass shrimp, whole Spearing and strips of clam.

Now it was that our Long-jawed Wrasse became the talk of the Aquarium. Everyone had to see it feed at least once, and the tankmen began to consider it their special pet. All of its former shyness gone, the fish spent most of its time in plain view near the surface of the water, frequently so near that it had to lie almost on its side. This in itself is not remarkable for a member of the wrasse Family — Hogfish, for example, do it regularly — but instead of diving toward the bottom when someone passed by the tank or flung an arm over the water, the Long-jawed Wrasse only backed up a bit, all the while ogling the intruder, usually first with one eye and then with the other. This alternation was made possible by a reversal of the side exposed to the surface, and between continuous flipping and simultaneous backing and filling, the fish gave a quite un-fishlike impression, strangely reminiscent of some four-footed animal begging for food. The effect of ogling was enhanced by the prominence of the eyes, which bulge distinctly, are ringed with a thin bright blue line, have an iris of burnished gold, and are extraordinarily mobile, moving up and down, forward and backward, undoubtedly in coordination with the fish's movements relative to the object it is viewing. A hand placed near the water was not the signal for a hasty retreat, as it would have been for most fish, but for a slow but deliberate approach. If a few fingers were immersed, these were carefully inspected from several angles to make certain they held no morsel. Tankmen Edward Dols and Charles Young, who were charged with the care of the specimen, were even able to touch it without causing undue alarm — a feat previously known to me only in fish that had undergone extensive periods of training. Small wonder that the fish was soon known by a pet name to all the tankmen. I have never seen any fish accommo-

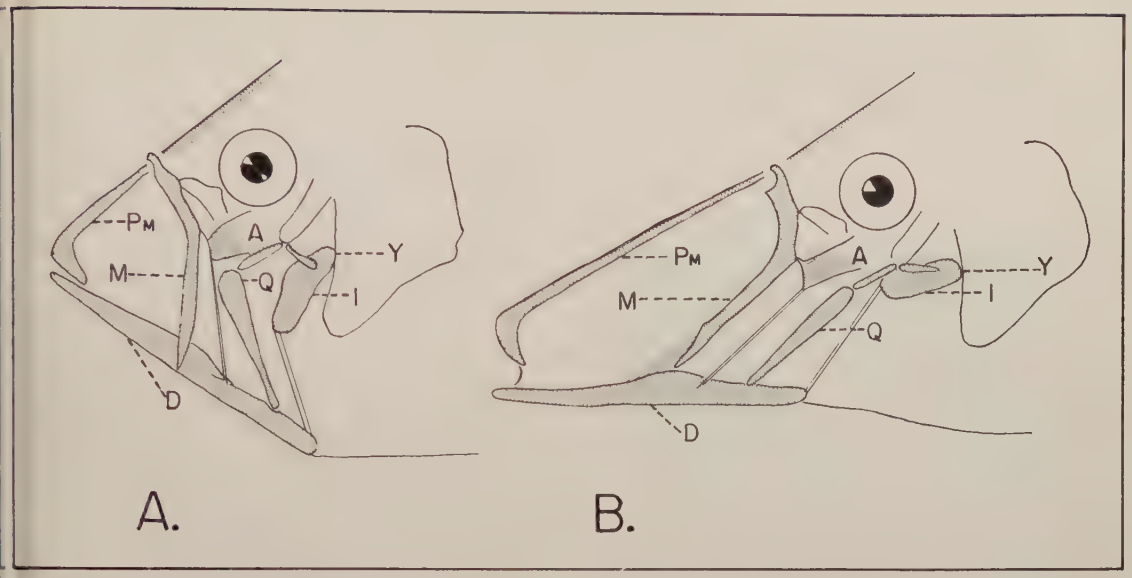
Although it has a fish in i mouth, this rare wrasse carri its jaws in the retracted, restin position. No indication of the protrusible nature is appare except the flap of skin extendin from the lower jaw to the ches

When it has taken a relatively large piece of food — in this instance a three-inch Killie — the Long-jawed Wrasse may hold it in its mouth for several minutes. The jaws are partly extended for most of this time. The protrusible part of the jaw is white.

date itself to human beings as quickly as did our Long-jawed Wrasse.

We do not know whether this adaptability to captive life is characteristic of all *Epibulus insidiator* or represents an idiosyncrasy of our particular specimen. This is the first one we have ever had in our collections, and it was one of three brought to the Steinhart Aquarium from the south central Pacific, apparently the first three Long-jawed Wrasses to reach the United State alive.

The fish's feeding habits are a continual sourc of surprise. This is the single aspect of the specie that has been studied in any detail by ichthyo ogists. At rest, the mouth and jaws look quit ordinary except for a backward extension of th lower jaw that gives it a peculiar, underslun appearance. When a Long-jawed Wrasse spo



These drawings, after Van Dobben, show some of the mechanics of the Long-jawed Wrasse's jaw movements. Movable bones are shaded. By means of a series of muscles and bones (not shown here) the interopercular bone (I) is rotated in a clockwise direction about the point Y. Since this bone is attached to the lower jaw by a ligament, it pulls forward the dentary bone (D). Ligaments also connect the dentary to the premaxillary (Pm) and maxillary (M) so the upper jaw moves forward at the same time. The adductor muscle (A), which is attached to both maxillary and dentary, pulls the jaws back to resting position (Fig. A.). In most fishes the quadrate (Q) is not movable, but helps to form a fixed hinge for the lower jaw.

ome prospective prey — and there is no doubt hat vision plays by far the most important sensory ole — it approaches, swimming by means of owing motions of its pectoral fins and a flutter- ng of the rear part of its dorsal fin (a typical vrasse kind of locomotion). When still a good wo inches away, it shoots out both its jaws, eizes the object, and before the startled observer ealizes what has happened, has returned both aws to the resting position. All the observer knows is that he saw a lightning-quick flash of vhite and that the food disappeared. Witnessing he performance several times helps very little; the raction of a second it takes is simply too quick or the human eye. But sometimes, especially fter eating, the Long-jawed Wrasse treats the bserver to a leisurely yawn-like extension of its aws, and then some idea of what is happening an be obtained. Full understanding, however, has required the study of dead specimens in which the complicated movements of bones and muscles could be analyzed step by step.*

The most remarkable feature of the anatomical arrangement that makes possible this highly efficient way of catching prey is the separation of the lower jaw from the rest of the skull. In the vast majority of bony fishes, the lower jaw is firmly attached to the rear of the skull. Quite a number of species can protrude the upper jaw; very few, if any, beside the Long-jawed Wrasse can simultaneously protrude the lower. The key to the downward and forward motion of the lower jawbone (the *dentary*) is the clockwise rotation of the *interoperculum*. The *maxillary* and *premaxillary* of the upper jaw move forward passively as a result of their firm attachment to the lower jaw by ligaments.

It is hard to believe that the unusual general behavior of the Long-jawed Wrasse is not in some way associated with its unique feeding mechanism, but as yet no obvious connection has suggested itself. Nevertheless, to us the species seems especially fit, both anatomically and psychologically, to make its way in the world.

* Delsman, *Treubia*, 6: 98-106, 1925. Van Dobben, *Arch. Néerland. Zool.*, 2: 61-63, 1935.

CONSERVATION FOUNDATION

F. Fraser Darling

Dr. Frank Fraser Darling has joined the staff of The Conservation Foundation as Vice-president and Director of Research. Dr. Darling is a formidable man. His publications include "West Highland Survey: A Study in Human Ecology," "Seasons and the Farmer," "History of Scottish Forests," "Wildlife Conservation," "Alaska – An Ecological Survey" (a Foundation project) and, more recently, "Pelican in the Wilderness," a description of his ecological observations in North America. He has recently completed two outstanding studies of the relationship of man to the flora and fauna of Northern Rhodesia and the Mara region of Africa.

A fellow of the Royal Society of Edinburgh, and holder of degrees of Doctor of Science and Doctor of Philosophy, Frank Darling will guide the continuing research work of The Foundation. This currently includes studies of population pressures, crop yields, water usage, Alaskan development and the effects of chemical pesticide on the environment. He will also have opportunity to continue his own field studies of the causes and consequences of environmental change of the United States, Africa and other parts of the world.

Animal Population Control

Dilemmas posed by use of pesticides for control of plant and animal populations are being set out in a new book sponsored by The Foundation for 1960 publication.

Prof. Robert Rudd of the University of California, a general zoologist with much practical experience in assessing the effects of pesticides on wildlife, is considering pesticides in relation to other natural controls of population numbers such as "beneficial" forms of insects and mammal predators.

His book will demonstrate why pesticide use can be carried out successfully only after deep knowledge of living interrelationships of a particular environment, whether it be crop field, forest or tidal wash. The book is addressed chiefly to fellow scientists, executives of the chemical industry, agricultural workers, government administrators and others in the field.

Preview for Science Teachers

More than a hundred members of the Chemistry Teachers' Club and the Physics Club of New York gathered at a joint meeting at the Fieldston School May 2 and heard Martha Munzer of the Foundation's staff explain and demonstrate the filmstrip series "Demand, Supply and Balance."

Conducting simple classroom experiments closely relating to the filmstrips, Mrs. Munzer explained that the teaching of conservation had usually been left to the biology teacher. She went on to

point out that teachers of physics and chemistry, dealing as they do with the basic matter, have an unusual opportunity to lead their students to a better understanding of resource use problems and possible solutions.

This preview is one of several set up throughout the country to interest teachers in teaching science through conservation. Other meetings have been scheduled in Alpine, Texas; Los Angeles, California; and Portland, Oregon.

Briefly Noted

Wallace Bowman, who received his Master's Degree in Conservation at Yale and later studied under Stan Cain at the University of Michigan, has joined the staff as Assistant Director of Research . . . Dr. Osborn made the principal address at the Centenary Banquet of the Quebec Wildlife Conservation Association on April 16 . . . Max Nicholson, director of Nature Conservancy of Great Britain, was a welcome visitor at the Foundation offices while in New York City in April-May . . . Steve Bergen, Assistant Director of Research, took an active part in the Cincinnati Water Pollution Conference sponsored by the U. S. Department of Health, April 20-24 . . . Roger Hale's report of the Berkeley Conference of Resource Management, complete with papers contributed and additional data, will be published by The Foundation in June . . . Fairfield Osborn conducted an April seminar on the subject of "World Population Food Supply" at the Institute of Nutritional Sciences, Columbia University . . .

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

"Free Lions" Offer Finally Finds Some Takers

The Lion market in the United States is fully saturated. The Mammal Department confirmed this as a fact in May when, after weeks of telephoning and letter-writing, it managed to dispose of four of the five adult Lions that have been exhibited on the African Plains since 1949. The four went to small zoos in upstate New York and New Jersey and the fifth was retained for exhibition in the Lion House.

Five young Lions about a year old have replaced the adults on the African Plains exhibit.

No difficulty in disposing of the adults was foreseen when we started offering them to other zoological parks early in the spring. It turned out that everyone had plenty of Lions and instead

More than a hundred members of the Bolshoi Ballet made an excursion to the Bronx Zoo on Sunday, April 26, and appeared to enjoy every minute of a thorough tour. Earlier, on April 24, an unexpected but most enthusiastic visitor was Premier Fidel Castro of Cuba, who said the Zoo was "the best thing New York has."

Early in May a confused Robin began building a nest on the fire escape of the Administration Building in the Zoo. She started nests on ten different steps, finally concentrating on four and completing one. Three eggs were laid and all hatched. House Sparrows found the abandoned nests a wonderful source of choice building material for their nests in the area.

of welcoming our magnificent specimens, several zoos offered us *their* surplus Lions.

Lions breed readily in zoological parks and cubs are readily available. Being much more active than elderly adults, they are preferred by most zoos, and adults – however impressive in size – are quite literally a dime a dozen.

Penguin Film Wins Award

A certificate of award for excellence has been given to the Society's motion picture film in color, "Adelie Penguins of the Antarctic," at a national awards ceremony sponsored by Scholastic Teacher Magazine. The film was created from footage shot in the Antarctic by Dr. William J. L. Sladen.

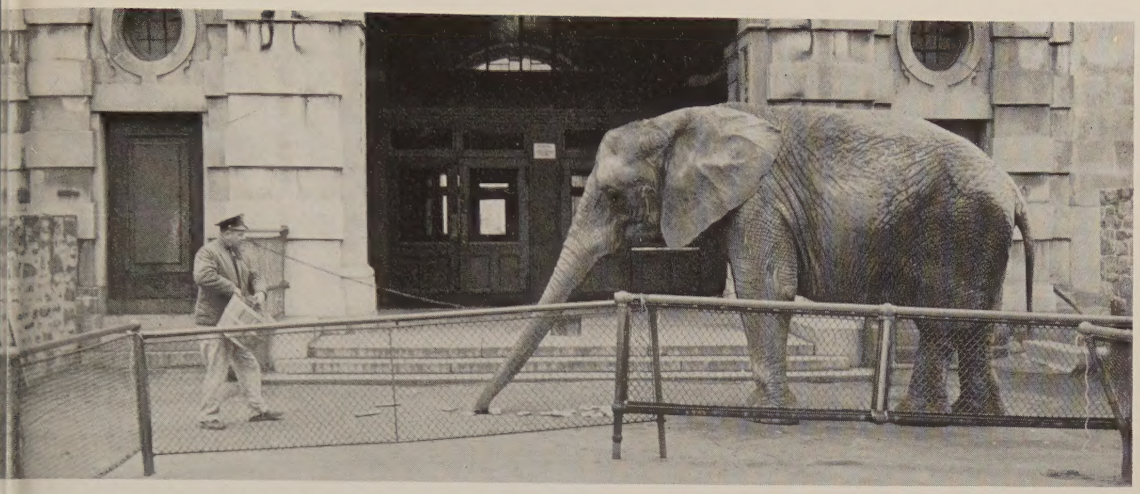
IN BRIEF

Bison Calf Born. There was a time, in the early years of the century and as late as the 1920s, when the birth of Bison calves in the collection was a commonplace. In later years our Bison herd has been reduced to merely one or two exhibition animals, and no calves have been born since 1934 – until May 26 when a bright rusty-red youngster was discovered with its mother in the Bison corral in the southeast corner of the Zoo. The mother is a new female, acquired early last winter, and was bred before coming to the Zoo.

Clean Great Apes. Shower baths delivering warm water have been installed in the Gorilla and Chimpanzee yards outside the Great Ape House and will run periodically during hot summer days. Mambo and Sumaili, the young Gorillas, were the first to get showers and were timid about the water for the first few days. Now they sit under it, splash and apparently enjoy their baths thoroughly.

New Pythons. Two Amethystine Pythons from Australia have been added to the Reptile House collection, the second time we have exhibited these big snakes which attain a length of about 20 feet. Our largest specimen is 13½ feet long.

Dr. Nigrelli to London. In mid-April Dr. Ross F. Nigrelli, the Aquarium's pathologist, gave a talk on the life span of fishes at the Ciba Foundation's fifth Colloquium on Aging in London.



"This far and no farther!" might well be Sudana's motto, for the middle of the walk marked the limit of her courage for several days when we made repeated attempts to transfer her from her familiar yard at the east side of the Elephant House walk to the yard on the west side. For some years Sudana has shared the east yard with two Asiatic Elephants and recently it was decided to pair Sudana up with Pinky, another African Elephant on the west side. Baited with slices of bread, she was willing to go half-way but not all of the way — she ate all she could reach and then backed into her old yard. Patience won; she is now in her new home.

Bahamas Legislature Acts on New Exuma Cays Park

In January, 1958, the New York Zoological Society sponsored a survey of the Exuma Cays in the Bahamas (*Animal Kingdom,* March-April, 1958). This was to be the site of the first real land-and-sea park.

A little more than a year later, in March, 1959, the Bahamas Legislature passed the Bahamas National Trust Act. This Act will soon be signed into law and will create a Trust with a governing Council composed principally of Bahamians with representatives of institutions (such as New York Zoological Society) in the United States and elsewhere. Therefore, the Act has international flavor, as the land-and-sea idea deserves.

The Bahamas Trust, like the British Trust, will be a private membership organization empowered by the Legislature to manage lands and waters for the benefit of Bahamians and tourists and for conservation, with the multiple purposes that the word implies. The Trust will work with the government in recommending that certain areas of land and sea be set aside as parks and sanctuaries. Some islands and waters of the Exuma Cays will be the first such area.

"Land-and-Sea Park" means exactly what it says, but most of us are not aware that the land and shallow sea are biologically and geologically part of the same province. The Exuma Cays Park, measuring about 22 by 5 miles, will be the first to protect land-and-sea as a unit on a large scale.

PUBLICATIONS OF INTEREST

TWO LITTLE SAVAGES. By Ernest Thompson Seton, with illustrations by the author. 416 pp. Doubleday & Co., New York, 1959. $3.95.

"Two Little Savages" was first published in 1903 and the adventures and woodcraft lore of Yan and Sam were (on the authority of one who read the book in 1912) the most wonderful and exciting things that were ever set down in print, or likely to be. Now there is a bright new edition for a much later generation of boys, and if they don't find it thrilling — well, so much the worse for them. The 1912 generation may be "dated," but "Two Little Savages" is not. — W. Br.

OF MEN AND MARSHES. By Paul L. Errington. 150 pp., 23 drawings by H. Albert Hochbaum. The Macmillan Co., New York, 1957. $4.50.

The Twentieth Century has produced its own brand of naturalist-writer. Although he may be as emotionally touched by the world of nature as was his Nineteenth Century counterpart, he is less interested in communicating this feeling to his readers. Instead, his principal intent is to pass on information — facts and principles

acquired through endless hours of observing, counting, measuring and thinking. His aim is to enlighten rather than enthrall. Paul Errington is one of our outstanding students of wildlife. For years he has lived intimately with our prairie wetlands, and out of his tremendous knowledge he has distilled a beautiful and truly satisfying account of marshes and what they can mean to us. This is how a professional naturalist looks at his world. – J. W. A.

AFRIKA vom Mittelmeer zum Aequator. 133 photographs in color and black-and-white by Emil Schulthess. Travel notes by Otto Lehmann, text by Emil Egli and Fritz Morgenthaler. Manesse Verlag, Conzett & Huber, Zurich, Switzerland, 1958. $14.50.

If there was any doubt that Emil Schulthess, the Swiss photographer, is one of the greatest photographers in the world today, this record of the first half of his African journey should settle the matter. He is. Whether it is scenery chosen with an unerring eye for color and composition, people in revealing attitudes, village commonplaces magically transformed or animals in the most striking settings, Mr. Schulthess can be counted on to take the breath away. Travel notes and text are in German, but the pictures need no translation. The book is large – 10 x 12¾ inches – and many of the plates are folded and therefore huge. And as all work from Conzett & Huber, they are superbly printed. – W. Br.

THE MAMMALS OF NORTH AMERICA. By E. Raymor Hall & Keith R. Kelson. 2 vols., 1,083 pp., 79 pp. index vernacular and technical names, 500 maps, 538 drawings of skul 186 drawings of mammals. The Ronald Press Co., New Yor 1959. $35.

A very useful work for the professional mammalogi and serious amateur, this is essentially an up-dated, i lustrated, and briefly annotated version of the 195 "List of North American Recent Mammals" by Mill & Kellog. It brings together for the first time in or publication detailed distribution maps of all speci found in North and Central America. Also include for most species are fine drawings of skulls and sketch of the entire animal. Some of the latter are excellen but most are undistinguished or poor for the purpose identification.

Mammalogists will differ with some of the taxonom interpretations and especially with the senior autho treatment of man and his relationship to the great ape Laymen having recourse to several field guides on th market will have little need to consult this rather tec nical work, unless their background is sufficiently tec nical to cope with some of the scientific terminology.

The chief value to the amateur lies in the delineatio and description of species found in Mexico and Centr America, a region which is not adequately treated i popular books. – J. A. D., Jr.

New Members of the New York Zoological Society

(Between March 1 and April 30, 1959)

Associate Founder

Joseph A. Thomas

Patron

Mrs. Helen W. Hansen

Supporting

Mrs. Walter G. Bent
Miss Cynthia Fay
Miss Myrtle A. Sperber

Contributing

Mrs. Daniel S. Ahearn
Stanley C. Allyn
Norman E. Blankman
Frank J. Brennan
Mrs. Paul J. Chase
Mrs. Henry E. Coe, III
Alfred Ely, III
Mrs. E. C. K. Finch
Henry J. Gaisman
Mrs. Louis S. Gimbel, Jr.
Mrs. F. H. Gronauer
Dr. Edward B. Grossman
Mrs. De Courcy L. Hard
Mrs. Alexandrina MacG. Hersey
Anthony Hume
Mrs. Hubert E. Hutton
Gunnar Maske
B. L. Mazel
Mrs. Grenville Merrill
Henry H. Moulton
Mrs. Case O'Brian
Carl N. Osborne
Dr. Frank Ratner
Judge Russell E. Train
Mrs. Grace A. Van Alstyne

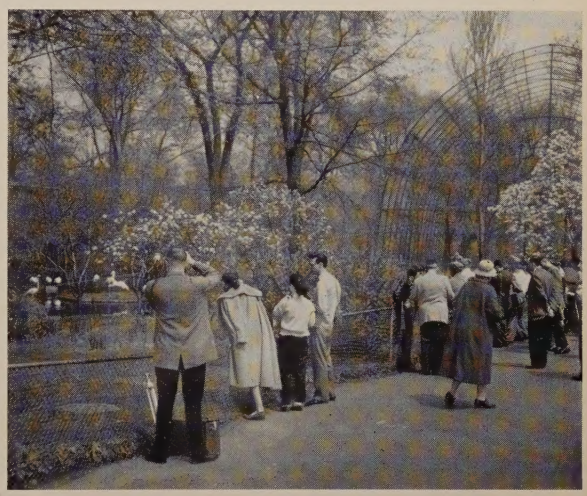
Annual

Bertram D. Aaron
Dr. David H. Baker
William F. Bartlett
Mrs. Selig Bernstein
Lars N. Boisen
Mrs. Mary Brude
Walter Chandoha
Mrs. Martha-Jane Locke Cook
George A. Davis
Mrs. L. Dourmashkin
Miss Patricia Doyle
Richard C. Duquette
David C. Eaton
Harry Elbaum
James M. Evarts
Henry J. Everett
Jonathan Fink
Mrs. Sheila Finkel
Mrs. Bert Freidus
Herbert Freudenthal
Eugene F. Gleason
David J. Goodman
Bronson W. Griscom
Parker D. Handy
Mrs. Jorj Harris
George Heffelfinger, Jr.
Victor Hirshfield
Mrs. Ellin Horowitz
Edwin P. Hoyt
David J. Jacobs
Miss Doris A. Jaeger
George M. Jaffin
Mrs. William S. Janes
Robert F. Kolkebeck
Ernest Koslan
Dr. Samuel A. Levine
Mrs. Henry C. Link
Harry Markowitz
James K. Maxwell
Mrs. Paul L. Miller
Mrs. J. A. Morton
Mrs. H. Nagourney
John J. Nogatch
D. P. O'Keefe
Mrs. George E. O'Shaughnessy
J. Robinsohn
Louis Rose
Mrs. E. B. Ross
Mrs. Stanley J. Rowland, Jr.
Mrs. Sidney M. Samis
Mrs. S. A. Shenker
Dr. Edward M. Shepard
Paul S. Snyder
Mrs. W. Edward Sweetman
Mrs. Rush Taggart, Jr.
Mrs. Barbara Brewster Taylor
Miss Susan Teaney
Mrs. Miriam F. Tom
John Oliver Truitt
Miss Grace Vanderhoff
Miss Fiorimonde Wedekind
Mrs. Myra Weinberg
Miss Kathryn W. Weiss
Dr. W. Lawrence Whittemore
William F. Wilkinson

CAMERA SAFARI CLICKS

A fine sunny morning . . . 80 Members with a wondrous assortment of cameras from Brownies to Leicas . . . kindly guidance by Staff Photographer Sam Dunton and Consultant Henry Lester . . . all conspired to make our *first* Members' Camera Safari a very pleasant occasion.

OKA, Lowland Gorilla, faces the cameras. Of this picture our professionals said: "Interesting definition, sharp focus . . . A 'just miss' shot because Oka is not accentuated. This photographer may catch a great picture one day, perhaps next time."



Limbering up at the Flamingo Pool, Members try to catch the grace of the birds, the delicacy of magnolia blossoms.

Members scramble to gain unusual vantage point for pictures of Lions on their island in the African Plains.

NEXT CAMERA TOUR: *Saturday, June 20, starts at the Administration Building at 10:30.*

REMEMBER: *Tours are restricted to Members only, or one person in a Member's family.*

NEW YORK ZOOLOGICAL SOCIETY
FOUNDED 1895